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Three New Species of the Genus *Kleidotoma* (Insecta: Hymenoptera: Figitidae: Eucoilinae) from Korea

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ABSTRACT

We describe three new species of the Genus *Kleidotoma* (Figitidae: Eucoilinae) from Korea. They are *K. convexitas* n. sp., *K. debilifovea* n. sp. and *K. longirudis* n. sp. A key to all Korean *Kleidotoma* species including three new species herein are given. Descriptions and illustrations of diagnostic characters of three new species are also provided.

Key words: *Kleidotoma*, Eucoilinae, Figitidae, new species, Korea

INTRODUCTION

The genus *Kleidotoma* Westwood belonging to the subfamily Eucoilinae (Family Figitidae) contains about 65 species in the world (Choi et al., 2008). It is known as a monophyletic group (Fontal-Cazalla et al., 2002) and characterized by the combination of concaved outer margin of fore wing, fully opened radial cell and very short R_1 vein (Choi et al., 2008).

The Eucoiline species are parasitoids of Diptera, and *Palaeosepsis* sp. (Diptera: Sepsidae) collected on bovine dung was reported as a host of *Kleidotoma* sp. (Diaz and Gallardo, 1996).

Kleidotoma pulchrinis Choi and *K. striaticollis* Cameron, have been previously recorded in Korea (Choi et al., 2008). In this study, we recognized three additional new species of *Kleidotoma* from Korea: *K. convexitas*, *K. debilifovea* and *K. longirudis*. We here provide a key to all the known Korean *Kleidotoma* species and descriptions and illustrations of diagnostic characters of the three new species.

MATERIALS AND METHODS

Morphological terminology used in this study follows Weld (1952). The measurements and relative proportions of body structures employed generally have been explained in Nordlander (1981, 1982) and the terminology of wing venation is after Lee and Choi (1993). Abbreviations used for the measurements are as followed; BTd: Distance between tentorial pits, Eh: Maximum diameter of compound eye, FAl: Length of face, FAw: Width of face, FRl: Length of frons. Hh: Height of head excluding mandibles, Hw: Width of head, IOd: Interocellar distance, PGw: Postgena width, LOl: Lateral ocellus length, LOw: Lateral ocellus width, MSl: length of malar space, Ml: Length of mesoscutum, OOd: outerocellar distance, PPl: Length of pronotal plate, PPw: Width of pronotal plate, Sl: Length of scutellum, Tw: Temple width.

Specimens are examined by the stereo microscope (Zeiss Stemi SV 11 Apo). Examined specimens are deposited in the Department of Biology, Yeungnam University in Korea.

Abbreviations used for the locality data are as followed: GB, Gyeongsangbuk-do; GN, Gyeongsangnam-do; GW, Gangwon-do.

SYSTEMATIC ACCOUNTS

Order Hymenoptera
Family Figitidae
Subfamily Eucoilinae
Genus *Kleidotoma*

Kleidotoma Westwood, 1833: 494 (Type-species: *Kleidotoma psiloides* Westwood).

Key to the Korean species of *Kleidotoma*

1. Pronotal plate projected on pronotum. Outer margin of posterior plate linear or rounded 2
– Pronotal plate not projected on pronotum. Outer margin of posterior plate concaved ..... *Kleidotoma longirudis* Choi n. sp.
2. Head oval. Mid and hind coxae with pale longitudinal stri-

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ae and sparse long fine hairs 3
- Head circular. Mid and hind coxae without striae or hairs 4

3. Scutellar fovea of scutellum deep and distinct. Compound eye 0.7X as wide as long. Fore wing with radial cell less than 2.3X as long as wide ..... *Kleidotoma convexitas* Choi n. sp.
- Scutellar fovea of scutellum not deep and boundary with scutellar disc indistinct. Compound eye less than 0.7X as wide as long. Fore wing with radial cell longer than 2.8X as long as wide ..... *Kleidotoma debilifovea* Choi & Suh n. sp.

4. Center of vertex smooth and polished. Female antennae stout and length of 4th to 10th segments subequal in width. Posterior plate of pronotal plate with irregular sculptures. Lateral bar of scutellum smooth, and scutellar fovea deep and distinct. Lateral upper part of pronotum with distinct striae. Hairy ring of 2nd abdominal segment strong but incomplete ..... *Kleidotoma striaticollis* Cameron
- Center of vertex with longitudinal striae. Female antennae not stout and length of 4th to 10th segments longer than width. Posterior plate of pronotal plate smooth. Lateral bar of scutellum with long vertical striae, and scutellar fovea not deep and boundary with scutellar disc indistinct. Lateral upper part of pronotum with weak striae. Hairy ring of 2nd abdominal segment incomplete ..... *Kleidotoma pulchrinis* Choi.

[1]*1. *Kleidotoma convexitas* Choi n. sp. (Fig. 1A-G)

Type Materials. Holotype: ♀ Korea: [GW] Hyangnobong, 13, May 1992. J.W. Lee (deposited at YNU). Paratype: 1♀ Korea: [GW] Hyangnobong, 13, May 1992. J.W. Lee; 1♀ Korea: [GW] Gansung, Konbong-sa Temple, 22, May 1992. J.W. Lee (deposited at YNU).

Description. Female. Body length 1.3-1.7 mm, Antennae 0.8-1.0 mm long, Fore wing 1.3-2.0 mm long.

Head oval, smooth and polished. Vertex medially smooth and polished and posteriorly with weak transverse striae. Frons and face smooth and polished with short sparse hairs. Weak groove under antennal sockets reach to the lateral sides of tentorial pit (Fig. 1B). Temple wide, smooth and polished with linear setae at the lower area (Fig. 1A). Cheek broad with single distinct linear malar groove. Mandible with long and dense hairs. Compound eyes rather small, 0.74X as wide as long. Antennae 13 segmented; the apical three segments in club shape with longitudinal rhinaria and covered entirely with long, fine hairs. Ratio of antennal segments 1.00 : 0.60 : 0.80 : 0.40 : 0.40 : 0.40 : 0.40 : 0.40 : 0.46 : 0.54 : 1.60 : 1.60 : 1.44 (Fig. 1E). Thorax smooth and polished. Pronotal plate projected on pronotum and margin of posterior plate straight. Lateral cavity distinct. Anterior plate with irregular transverse striae but posterior plate with fine punctures. Mesoscutum smooth and polished. scutellar disc with irregular longitudinal striae. Lateral bar smooth; 0.73X as long as scutellum. Scutellar fovea deep. Dorsal cup long ovate medially with two setae; as long as the scutellum in dorsal view (Fig. 1C). Pronotum laterally smooth and polished; entirely with sparse long fine hairs but anteriorly with very weak hairs. Mesopleuron smooth and polished. Mesopleural suture distinct. Propodeum laterally with long and dense hairs but with short and thin hairs at other area (Fig. 1A). Propodeal carinae distinct and oval. Legs entirely with sparse and long hairs; coxa with weak striae (Fig. 1A). Fore wing with long cilia from middle of anterior margin to middle of posterior margin; outer margin concaved. Radial cell fully opened, 2.25X as wide as long (Fig. 1D). Abdomen smooth and polished, 0.68X as long as wide. Hairy ring of the 2nd abdominal segment strong but dorsally incomplete (Fig. 1A).

Body entirely blackish brown to black. Antennae and legs reddish brown to blackish brown. Wing veins yellowish brown to dark reddish brown.

Measurements: Hh/Hw: 1.00, LOl/LOw: 1.33, IOD/OOD: 0.60, FRl/FAl: 0.25, FAl/FAw: 1.20, dHl/dHw: 0.78, Tw/PGw: 0.67, BTD/FAw: 0.40, MSl/Eh: 0.47, PPl/PPw: 0.59, Ml/Sl: 1.45, Sc+R/Sc+R1: 3.73, r/Rs: 0.59.

Male. unknown.

Distribution. Korea

Host records. Unknown.

Etymology. The name is derived from the Latin word *convexitas* (meaning convex) because of its convex propodeum.

Remarks. This species is similar to *K. debilifovea* by following characters: pronotal plates projected on pronotum, margin of posterior plate straight, oval shape of head and hind coxae with longitudinal striae. However, it is distinguished by deep and distinct scutellar fovea.

[2]*2. *Kleidotoma debilifovea* Choi & Suh n. sp. (Fig. 2A-G)

Type Materials. Holotype: ♀ Korea: [GN] Uiryong, Mt. Jogul, 12, June 1990. J.S. Park (deposited at YNU). Paratype: 1♀ Korea: [GB] Kyungsan, 7, September 1988. W.Y. Choi (deposited at YNU).

Description. Female. Body length 1.3-1.4 mm, Antennae 0.75-0.82 mm long, Fore wing 1.3-1.5 mm long.

Head oval, smooth and polished. Vertex medially smooth and posteriorly with weak transverse striae. Frons and face

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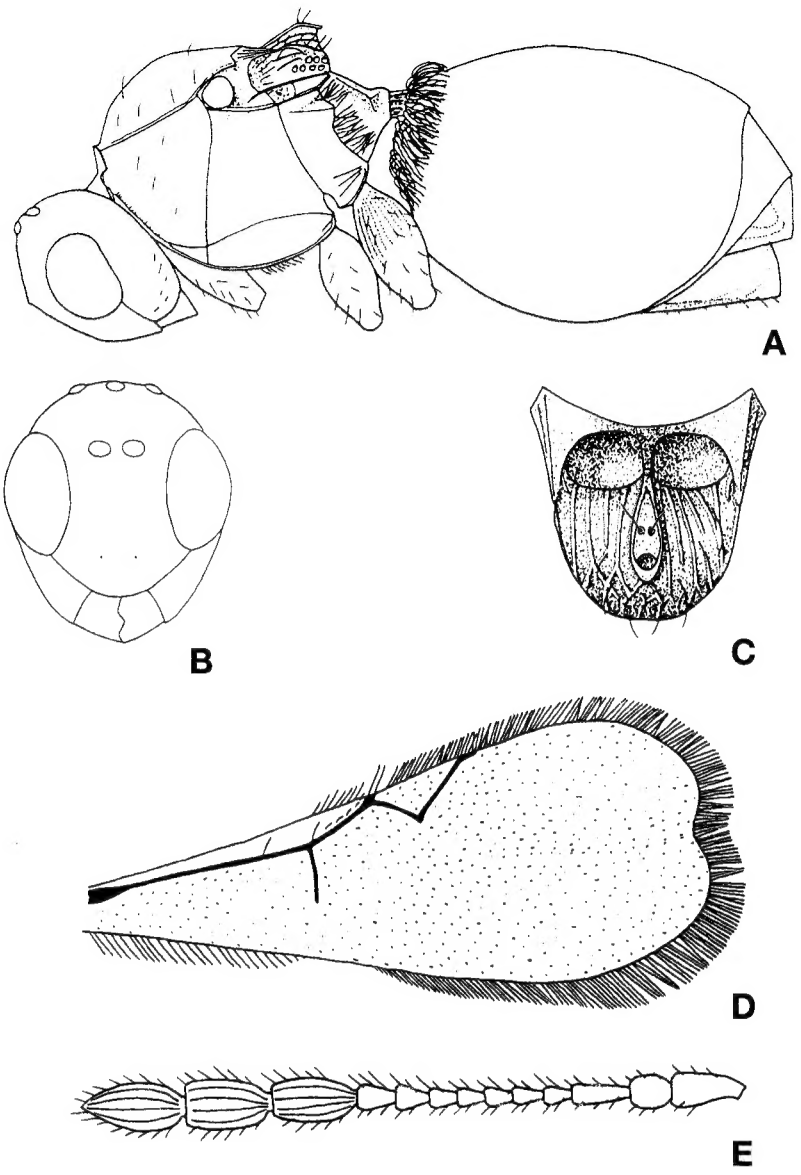

Fig. 1. Holotype (female) of *Kleidotoma convexitas* Choi n. sp. A, Whole body in lateral view; B, Head in frontal view; C, Scutellum in dorsal view; D, Forewing; E, Antennae.

smooth and polished with short sparse hairs. Two linear fine hairs under antennal sockets (Fig. 2B). Temple wide, smooth and polished with weak striae at the upper part. Cheek broad with distinct one lined malar groove (Fig. 2A). Mandible with long and dense hairs. Compound eyes rather small, 0.65X as wide as long. Antennae 13 segmented with 3 segmented club and each club segments with longitudinal strong rhinaria and long, fine hairs. Ratio of antennal segments 1.00 : 0.70 : 0.80 : 0.40 : 0.44 : 0.40 : 0.40 : 0.44 : 0.44 : 0.50 : 1.00 : 1.60 : 1.40 (Fig. 2E). Thorax smooth and polished. Pronotal plate weakly projected on pronotum and margin of posterior plate straight; lateral cavity distinct; anterior plate with irregular transverse striae but posterior plate smooth. Mesoscutum smooth and polished. Apex of scutellar disc rounded with longitudinal striae with long and strong hairs along posterior margin. Lateral bar with longitudinal striae and 0.55X as long as scutellum. Scutellar fovea not deep. Dorsal cup long ovate with two setae at the center and 0.90X as long as scutellum (Fig. 2C). Pronotum laterally smooth and polished anteriorly with dense, tuft hairs. Mesopleuron smooth and polished. Mesopleural suture distinct. Propodeum laterally with long and dense hairs but with short and thin hairs at other area. Propodeal carinae distinct and oval (Fig. 2A). Legs with sparse and long hairs entirely and coxa

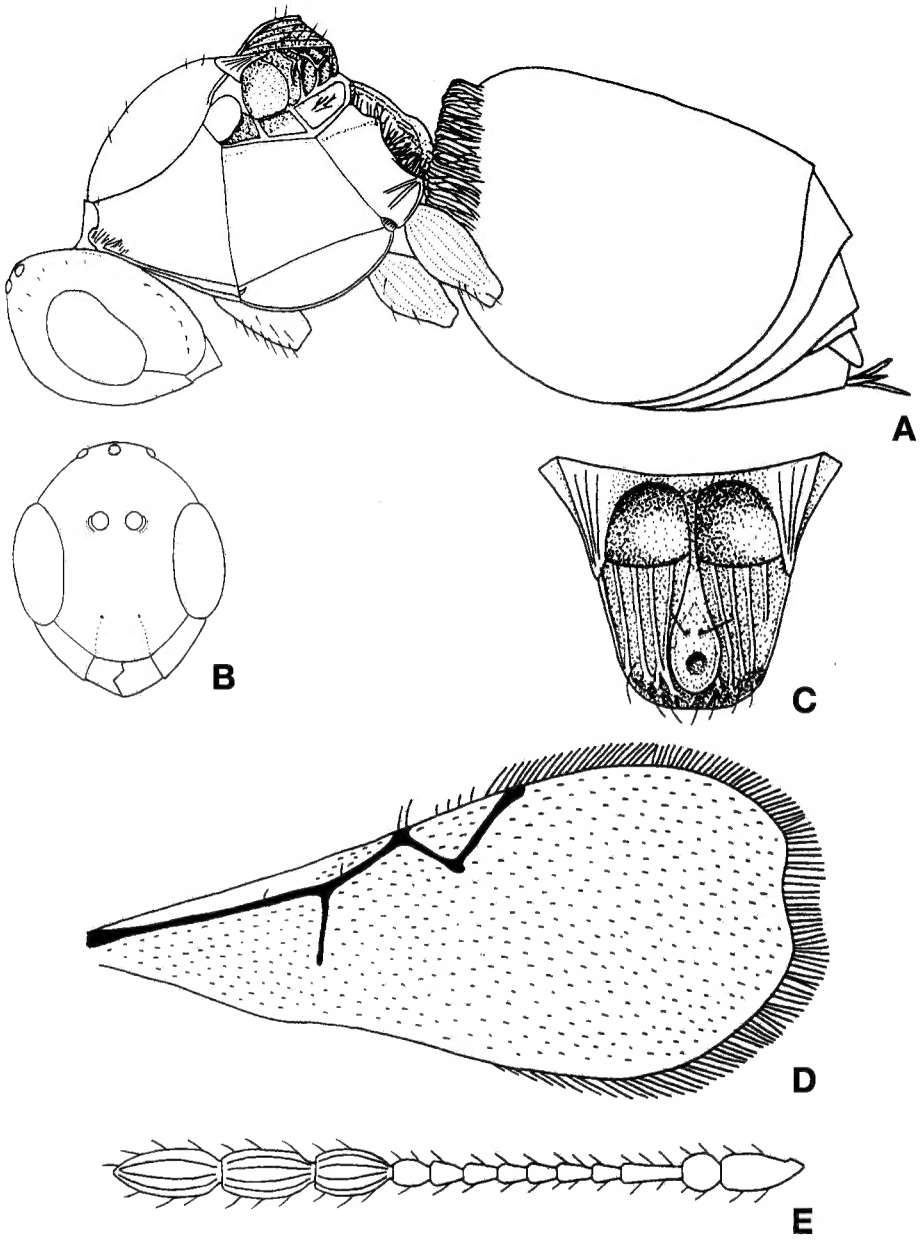

Fig. 2. Holotype (female) of *Kleidotoma debilifovea* Choi & Suh n. sp. A, Whole body in lateral view; B, Head in frontal view; C, Scutellum in dorsal view; D, Forewing; E, Antennae.

with weak striae. Fore wing covered with short hairs but with long cilia from middle of anterior margin to middle of posterior margin; outer margin weakly concaved. Radial cell fully opened, 2.89X as wide as long (Fig. 2D). Abdomen polished with fine punctures, 0.59X as wide as long. Hairy ring of the 2nd abdominal segment strong but dorsally incomplete (Fig. 2A).

Head and thorax blackish brown to black. Antennae reddish brown but apical segments darker. Abdomen blackish brown. Legs reddish brown to blackish brown. Wing veins brown.

Measurements: Hh/Hw: 1.00, LOl/LOw: 1.33-1.38, IOD/OOD: 0.71-0.83, FRl/FAl: 0.30-0.36, FAl/FAw: 1.20, dHl/dHw: 0.69, Tw/PGw: 0.55-0.67, BTD/FAw: 0.30-0.44, MSl/Eh: 0.55, PPl/PPw: 0.64, Ml/Sl: 1.55, Sc+R/Sc+R1: 2.85, r/Rs: 0.70

Male. unknown.

Distribution. Korea

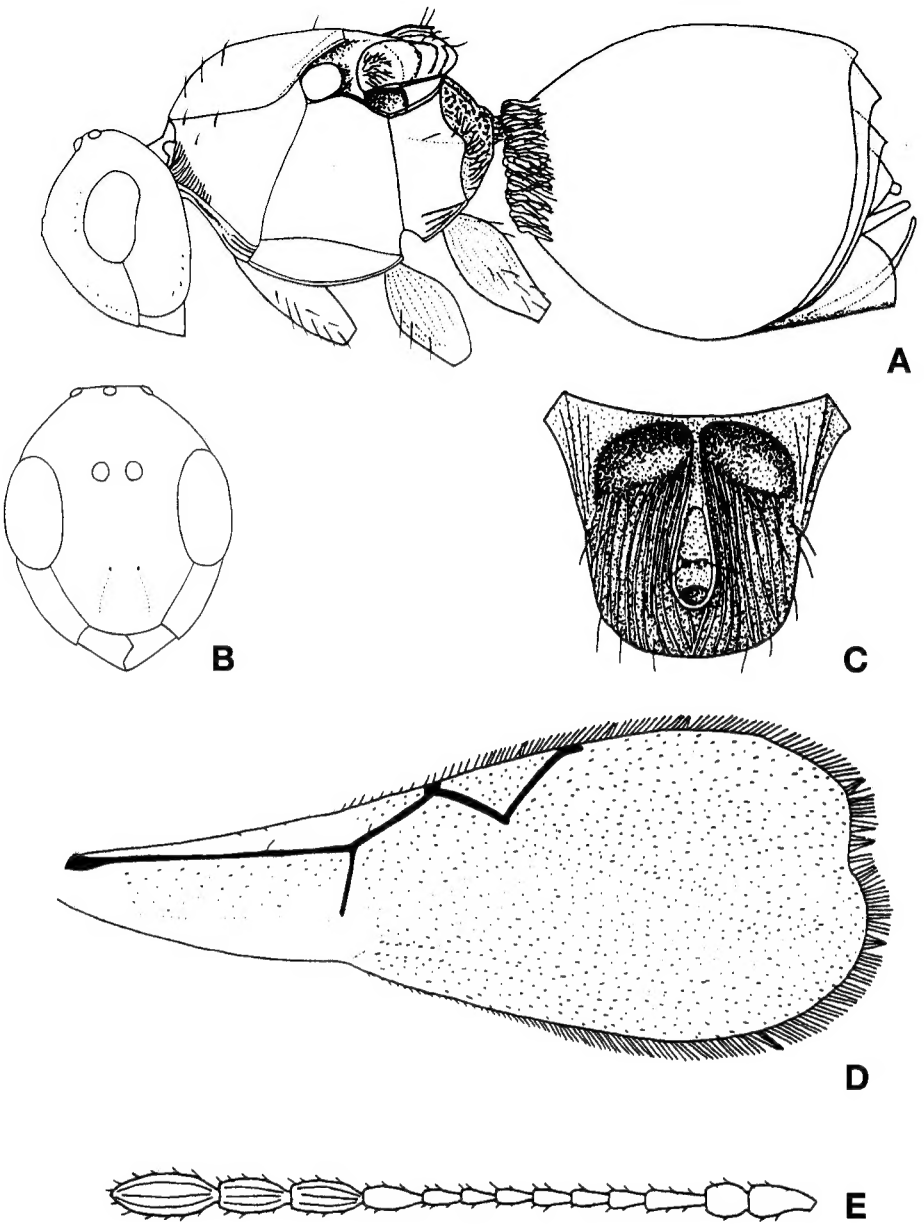

Fig. 3. Holotype (female) of *Kleidotoma longirudis* Choi n. sp. A, Whole body in lateral view; B, Head in frontal view; C, Scutellum in dorsal view; D, Forewing; E, Antennae.

Host records. Unknown.

Etymology. The name is derived from the Latin words *debilis* (meaning weak) and *fovea* (meaning pit) because of its relatively shallow scutellar fovea.

Remarks. It is similar to *K. convexitas* but distinguished by scutellar fovea of scutellum not deep and boundary with scutellar disc indistinct.

[1]*3. *Kleidotoma longirudis* Choi n. sp. (Fig. 3A-G)

Type Materials. Holotype: ♀ Korea: [GN] Sachun, 27, May 1992. Y.H. Paik (deposited at YNU). Paratype: 1♀ Korea: [GN] Sachun, 27, May 1992. Y.H. Paik (deposited at YNU).

Description. Female. Body length 1.2-1.4 mm, Antennae 0.7-0.9 mm long, Fore wing 1.3-2.0 mm long.

Head oval, smooth and polished. Vertex medially with fine

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punctures and posteriorly with weak transverse striae. Frons and face smooth and polished with short sparse hairs (Fig. 3B). Temple wide, smooth and polished. Cheek broad with distinct one lined malar groove (Fig. 3A). Mandible with long and dense hairs. Compound eyes rather small, 0.67X as wide as long. Antennae 13 segmented with 3 segmented club and each club segments with longitudinal strong rhinaria with long and fine hairs. Ratio of antennal segments 1.00 : 0.60 : 0.80 : 0.50 : 0.44 : 0.40 : 0.40 : 0.40 : 0.44 : 0.50 : 1.00 : 1.00 : 1.10 (Fig. 3E). Thorax smooth and polished. Pronotal plate not projected on pronotum and margin of posterior plate concaved; lateral cavity distinct; anterior plate with irregular transverse striae but posterior plate smooth. Mesoscutum smooth and polished with fine punctures. Apex of scutellar disc rounded with weak longitudinal striae with long and strong hairs along the margin. Lateral bar with weak longitudinal striae and 0.44X as long as scutellum. Scutellar fovea not deep. Dorsal cup long ovate medially with two setae and 0.83X as long as scutellum (Fig. 3C). Pronotum laterally smooth and polished with dense, tuft hairs at the anterior. Mesopleural suture distinct. Propodeum laterally with long and dense hairs but with short and thin hairs at other area. Propodeal carinae distinct and oval (Fig. 3A). Legs with sparse and long hairs; coxa with weak striae. Fore wing with long cilia from middle of anterior margin to middle of posterior margin and outer margin weakly concaved. Radial cell fully opened, 2.40X as wide as long (Fig. 3D). Abdomen large, smooth and polished, 0.75X as wide as long. Hairry ring of the 2nd abdominal segment strong but dorsally incomplete (Fig. 3A).

Body entirely blackish brown to black. Antennae and legs reddish brown to blackish brown. Wing veins yellowish brown to dark reddish brown.

Measurements: Hh/Hw: 1.00, LOl/LOw: 1.25-1.50, IOD/OOD: 0.75-0.83, FRl/FAl: 0.40-0.56, FAl/FAw: 1.00-1.10, dHl/dHw: 0.67-0.71, Tw/PGw: 0.57-0.67, BTD/FAw: 0.44, MSl/Eh: 0.56-0.60, PPl/PPw: 0.50-0.62, Ml/Sl: 1.48-1.56, Sc+R/Sc+R1: 2.40-2.80, r/Rs: 1.30-1.67

Male. unknown.

Distribution. Korea

Host records. Unknown.

Etymology. The name is derived from the Latin words *longus* (meaning long) and *rudis* (meaning rough) because of its long and strong hairs on the lateral margin of scutellum.

Remarks. It is distinguished by following characters: pronotal plate not projected on pronotum and outer margin of posterior plate concaved.

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